

---

```
%Charles Keer
%Controls Exam 2
clear
clc
close all

%Problem 1

%Initial system step response
num = [1];
denom = [1,5,7]
s = tf(num,denom);
figure
step(s);
title("P1 Uncompensated Step Response")

% Choose a gain of 3.5 for system and plot system
% with lead compensator design and CL function

num2=[3.5];
denom2 = [1,7.34,14.18];

s2 = tf(num2,denom2);
figure
step(s2);
stepinfo(s2)
title("P1 Compensated Step Response")

%Given that our parameters was a 1.5 s, this system outputs
% a 1.47 settling time, which is within the given parameters.

%Problem 2

%uncompensated lead root locus

num3 =[3.5];
denom3 = [1,7.34,10.68];
s3 = tf(num3,denom3);
figure
rlocus(s3);
title("P2 Uncompensated Root Locus")

%Compensated lead-lag root locus
num4 = [460,69.276];
denom4 = [1,7.35,10.7534,0.1068];
s4 = tf(num4,denom4);
figure
rlocus(s4)
title("P2 Compensated Root Locus")
```

---

---

```

%Step input with closed loop G(s)
num5 = [460,69.276];
denom5 = [1,7.35,470.7534,69.3828];

s5 = tf(num5,denom5);
figure
step(s5)
stepinfo(s5)

title("P2 Compensated Step Response")

```

```
denom =
```

```

1      5      7

```

```
ans =
```

```
struct with fields:
```

```

    RiseTime: 0.8587
TransientTime: 1.4723
    SettlingTime: 1.4723
    SettlingMin: 0.2225
    SettlingMax: 0.2467
    Overshoot: 0
    Undershoot: 0
        Peak: 0.2467
    PeakTime: 2.3716

```

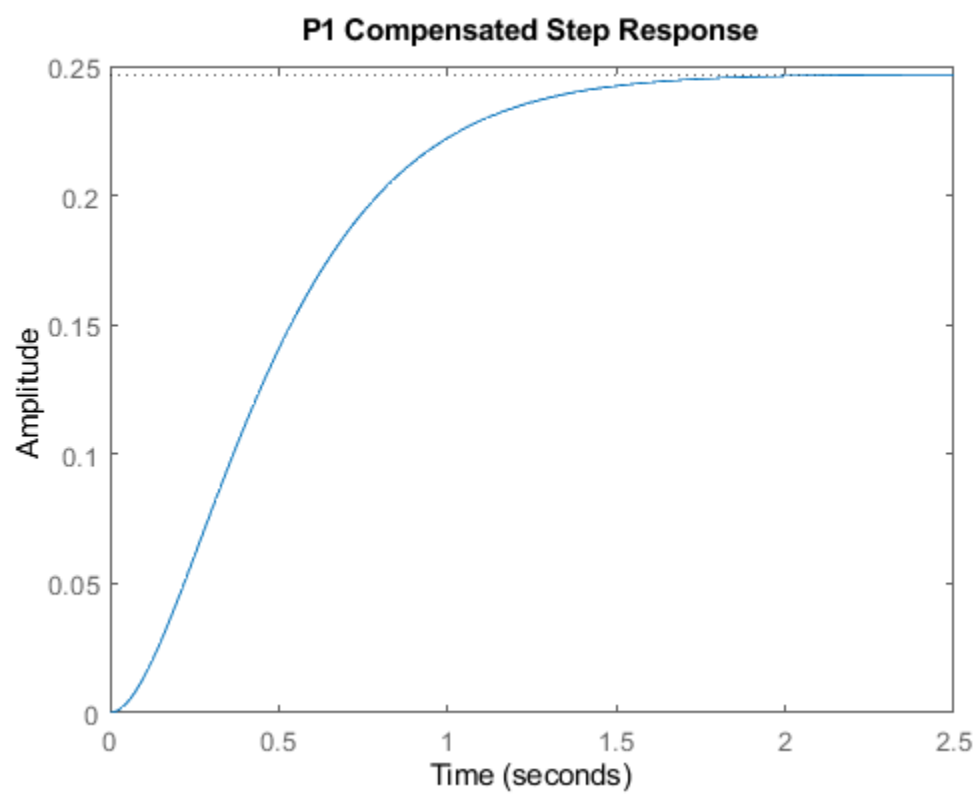
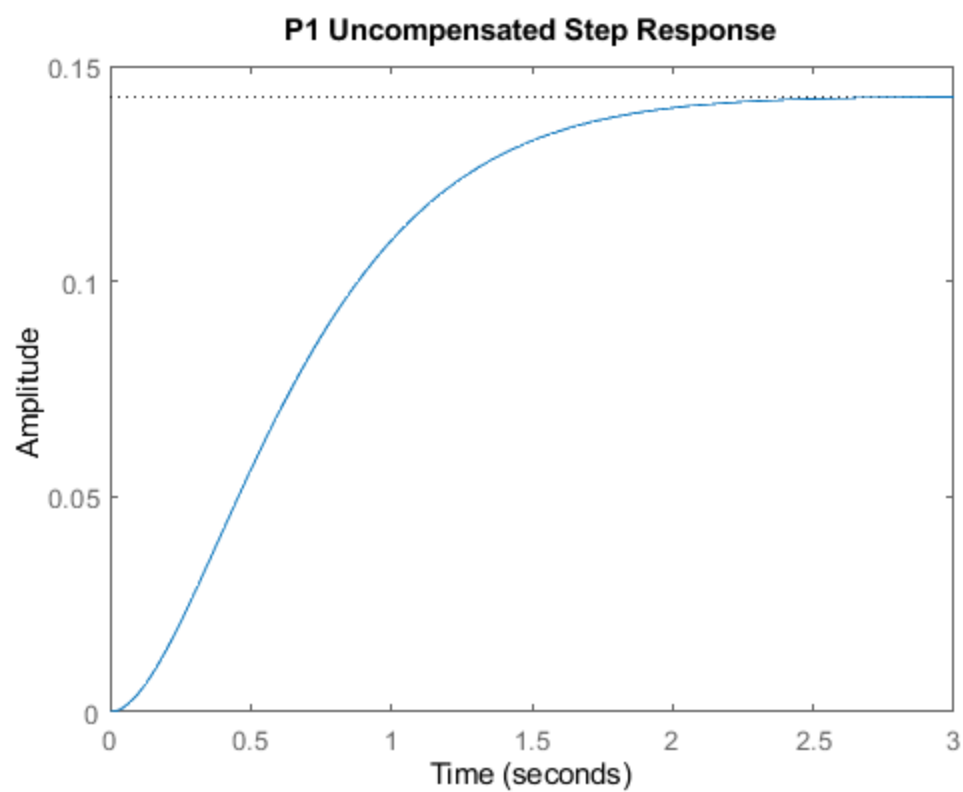
```
ans =
```

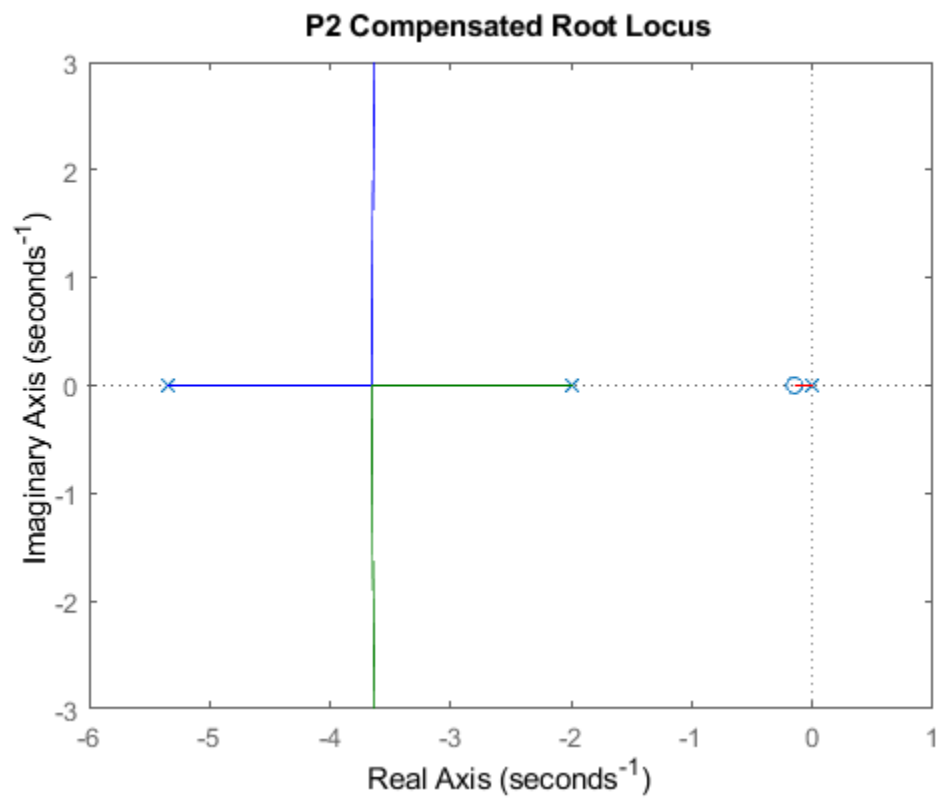
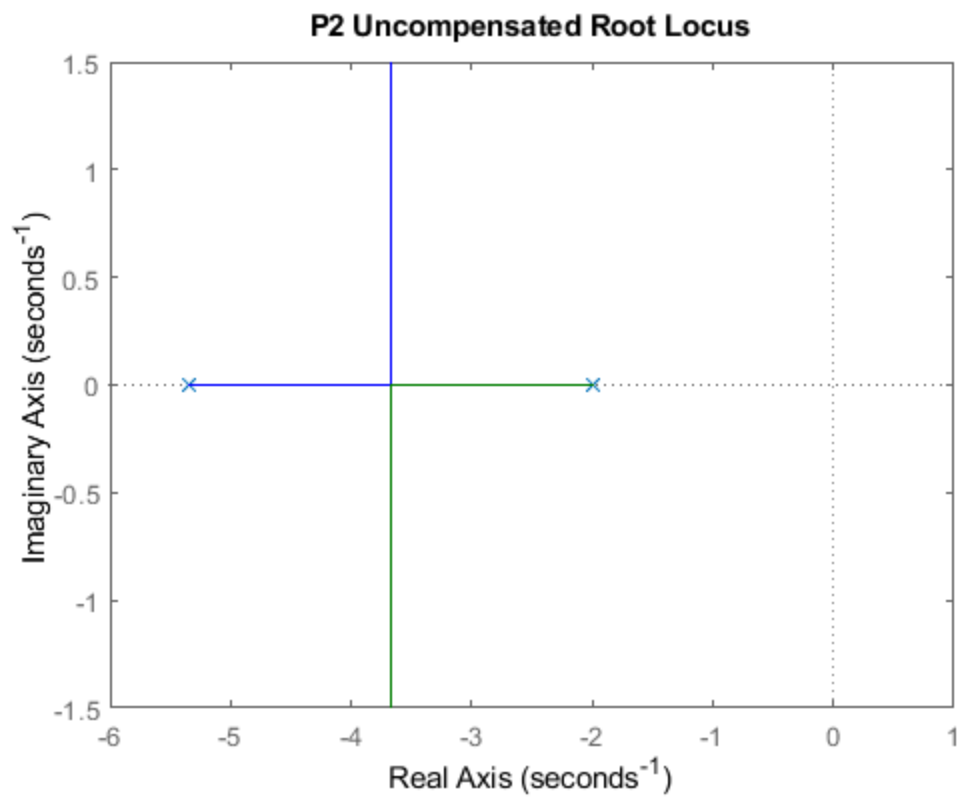
```
struct with fields:
```

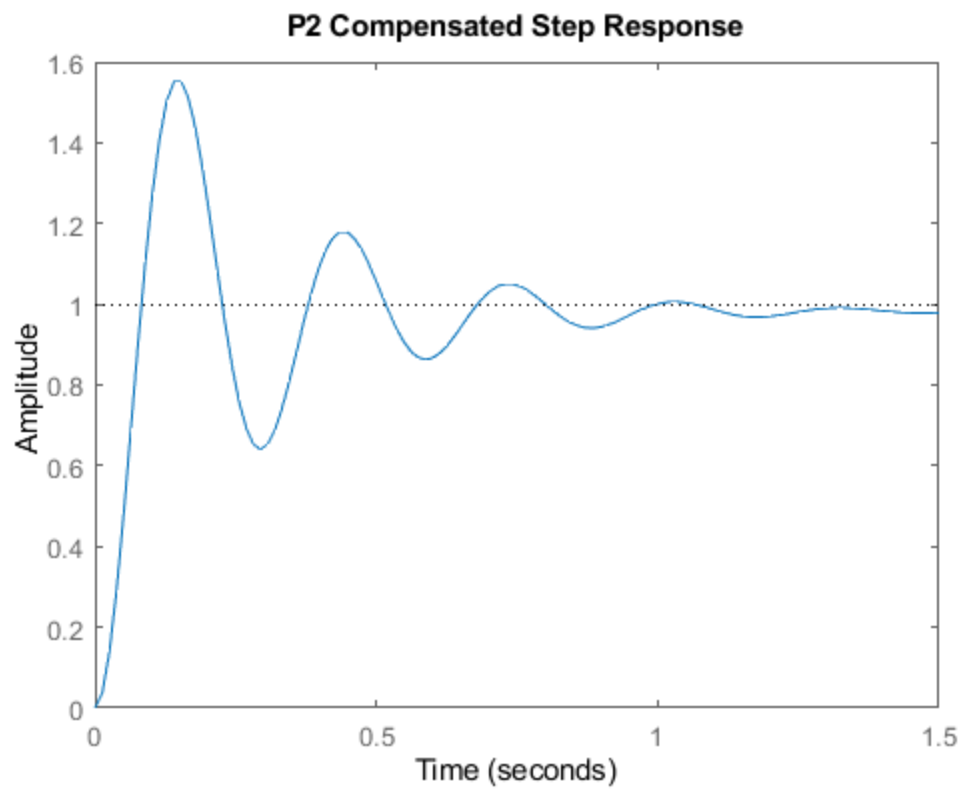
```

    RiseTime: 0.0555
TransientTime: 1.4861
    SettlingTime: 1.4861
    SettlingMin: 0.6404
    SettlingMax: 1.5510
    Overshoot: 55.3407
    Undershoot: 0
        Peak: 1.5510
    PeakTime: 0.1535

```







*Published with MATLAB® R2023a*